Unexamined Application for Utility Model S55-74198

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No Symbol

Application for Registration of Utility Model (2)

To The Patent Examiner November 15, 1978

1. Title of the Device
PIEZOELECTRIC MICROPHONE
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(Contact : Tokyo Office Phone: 508-1251) 7 digits corrected
4. Record of Attached Documents
1) Specification 1 copy
2) Figures 1 copy
3) Duplicate application 1 copy
4) (copy)

Patent Office November 16, 1978, 2nd Application Section
17-74198
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Specification

1. Title of the Device

PIEZOELECTRIC MICROPHONE

2. Scope of Claims of Utility Model Registration

A piezoelectric microphone comprising:

a printed substrate comprising a shield electrode on a lower surface and, on an upper surface of a thin plank of a flexible insulating material, a center electrode, an extraction electrode extending therefrom to a first end portion of the insulating thin plank, and an outer peripheral electrode enclosing the center electrode and the extraction electrode;

a flexible piezoelectric element contacting an upper surface of the center electrode of this substrate; and

an electrode member comprising a conductive elastomer covered thereon so as to contact an upper side surface of the piezoelectric element and the outer peripheral electrode of the printed substrate;

being joined in a single body.

3. Detailed Description of Device

The present device is related to a piezoelectric microphone that is used primarily for measurement of the blood pressure, measurement of heart sounds, and the like of the human body. An object thereof lies in providing a piezoelectric microphone having superior flexibility and mechanical strength and that is further provided with a high shielding effect. The device will be explained in detail in accordance with the drawings below.

In FIG. 1, 1 shows a printed substrate provided on an upper surface of a thin plank 1a of a flexible insulating material such as a polyimide resin with: a center electrode 1b provided in an area other than an outer peripheral portion thereof, an extraction electrode 1b' provided extending from the center electrode 1b toward a first end portion 1a' of the insulating thin plank, and an outer peripheral electrode 1c provided over an entire area of the insulating thin plank 1a and enclosing the center electrode 1b and the extraction electrode 1b' within an insulating gap; the printed substrate being provided on an entire bottom surface with a shield electrode 1d. Each of these electrodes 1b, 1b', 1c, and 1d are printed on a copper foil or the like in a known manner. 2 is a flexible piezoelectric element contacted to the top of the center electrode 1b that is on an upper surface of the printed substrate 1, and is made from a high polymer piezoelectric material such as polyvinylidene fluoride or from a piezoelectric magnetic powder dispersed uniformly in a natural or synthetic rubber or a synthetic resin to make a high polymer composite piezoelectric material, which is stretched or pressed into a film shape or sheet shape in a known manner, and the center electrode 1b governs one electrode of the piezoelectric element thereby. 3 is an electrode member that governs a second electrode of the flexible piezoelectric element 2, which the electrode member covers so as to contact an upper surface of the piezoelectric element and the outer peripheral electrode 1c of the printed substrate, and is constituted from a conductive elastomer such as conductive rubber of conductive resin.

The printed substrate 1, piezoelectric element 2, and electrode member 3 are bonded together as a single body using thermo compression bonding, simultaneous vulcanization, or other appropriate bonding means. After bonding, preferably the extraction electrode 1b' of the center electrode that is exposed at the first end portion 1a' of the printed substrate and a terminal 1c' of the outer peripheral electrode are, for example, subject to a polarization treatment by applying a high-voltage direct current of around 100 kv/an [*sic*]for from few minutes to a few

dozen minutes and heating to from 50°C to 150°C, so that degradation in the polarization due to heat from the compression bonding, vulcanization, or the like will not occur. Afterward, a lead wire 4 for signal transmission and a lead wire 4' for grounding are each connected.

The shield electrode 1d provided in the lower surface of the printed substrate 1 is connected as a ground to the outer peripheral electrode 1c on the upper surface by a conductive through hole 1e. This also has an operation whereby the shielding effect is further strengthened, because the outer peripheral electrode 1c is positioned so as to enclose the center electrode 1b and extraction electrode 1b'.

Next, FIG. 2 shows another embodiment of the present device. Here, a printed substrate having on an upper surface of a thin plank 1a of a flexible insulating material a center electrode 1b, an extraction electrode 1b' and an outer peripheral electrode 1c; a lower surface of a flexible piezoelectric element 2 contacting a top of the center electrode 1b; is covered by an electrode member 3 consisting of a conductive elastomer so as to contact an upper side surface of the flexible piezoelectric element 2 and the outer peripheral electrode. Furthermore, a lower surface of the printed substrate 1 is coated with a shield electrode 5 constituted of the same conductive elastomer as the electrode member 3, instead of the metal foil of the embodiment of FIG. 1, and all of these components are joined as a single body. In the case of this embodiment, the flexibility of the printed substrate can be increased and an overall structure having an amply satisfactory flexibility can be provided.

The piezoelectric microphone of the present device is configured as described above. Therefore, a structure is presented in which each constituent part including the printed substrate, piezoelectric element, electrode member, and the like is constituted of a flexible material, so the overall structure has superior flexibility in a thin shape. Therefore, the microphone can be placed with good adhesion to the skin surface of the human body during measurement of blood pressure and heart sounds, without the measurement subject feeling the presence of a foreign object, pain, or the like. Furthermore, because the printed substrate reinforces the piezoelectric element and increases the mechanical strength, handling is extremely easy, without damage to the piezoelectric element occurring due to stress from pulling or shearing. Furthermore, a shielding effect is brought about by the shield electrode, so the occurrence of noise from static electricity is controlled, providing versatile effects such as accurate and true measurement of blood pressure, heart sounds, and the like.

4. Detailed Description of the Drawings

FIG. 1 shows a piezoelectric microphone according to one embodiment of the present device, and A is a perspective view, B is a cross section view along a line i – i, and C is an exploded perspective view thereof. FIG. 2 shows another embodiment according to the present device, and A is a perspective view, B is a cross section view along a line y – y, and C is an exploded perspective view thereof.

1. printed substrate, 1a. flexible insulated thin plate, 1b. center electrode, 1d, 5. shield electrode, 1b'. extraction electrode, 1c. outer peripheral electrode, 2. Flexible piezoelectric element, 3. electrode member.

Applicant for Registration of Utility Model: NGK Spark Plug Co., Ltd.
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FIG. 1 A

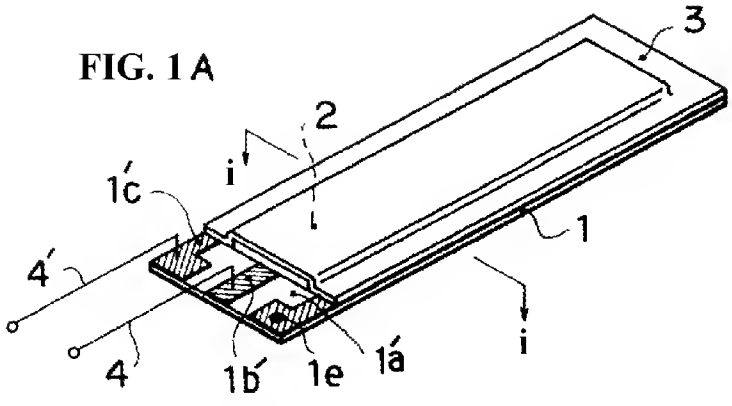

FIG. 1 B

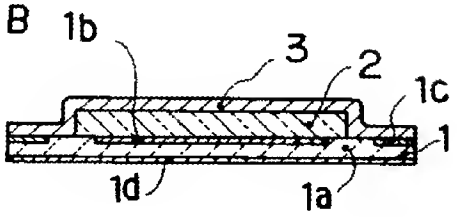

FIG. 1 C

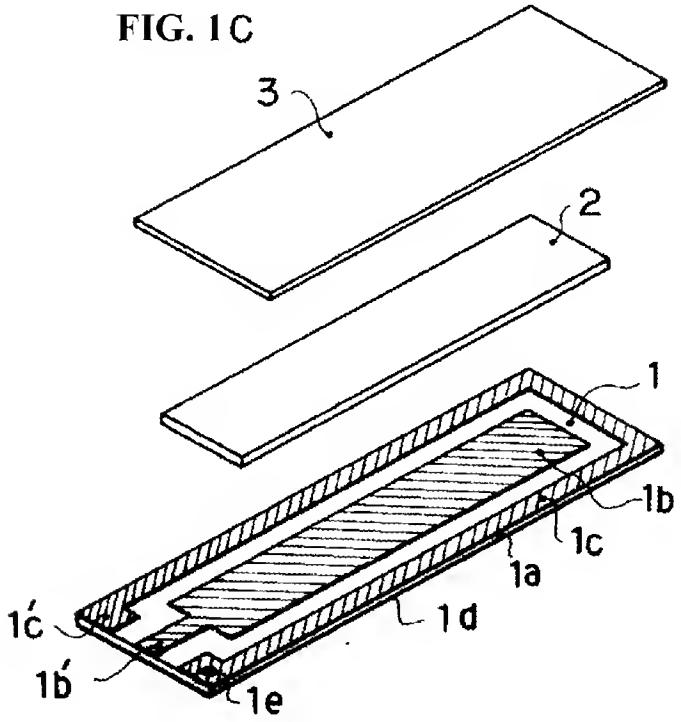

FIG. 2 A

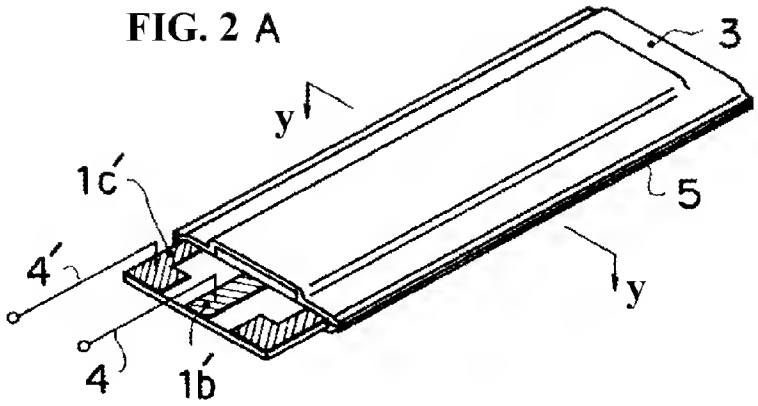

FIG. 2 B

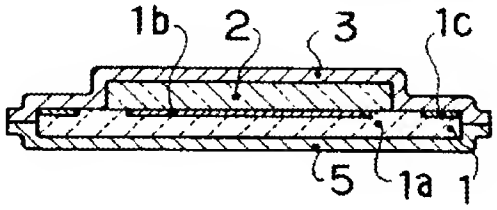

FIG. 2 C